PATENT ABSTRACTS OF JAPAN

(54) RADIO MULTICAST RECEPTION STATION GROUP CONSTITUTION METHOD AND RADIO STATION USING THE METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To provide the constitution method of a reception station group in a radio multicast communication system for grouping multicast reception stations.

SOLUTION: A mobile station to newly start radio multicast communication monitors a present multicast session (S1), and in the case of recognizing that a multicast session desiring receptions is present (S2) and the reception station group is present around (S5), it transmits participation request signals in order to join the reception station group to a radio base station (S6), and the radio base station transmits response signals for allowing the mobile station to be the constitution station of the reception station group indicated by the participation request signals (S7). On the other hand, in the case of recognizing that the reception station group is not present around (S5), the group opening request signals of the reception station group are transmitted to the radio base station (S8), and the radio base station transmits a group opening response for allowing the mobile station to be the constitution station of a new reception station group (S9).
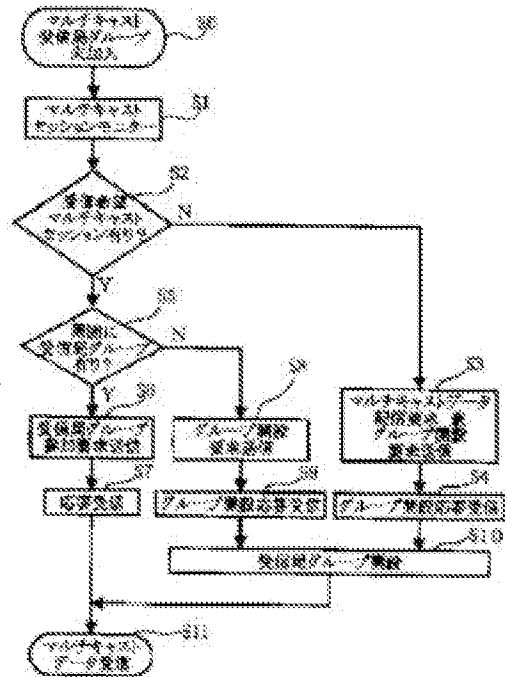
[Claim(s)]

[Claim 1]A multicast-transmissions office creates a frame which gave an identifier of an address receiving station group to multiple address data, In order to perform radio multicast communication

which transmits multiple address data to a multicasting receiving station once registered as said address receiving station group by frame transmission, In a radio communications system which has a receiving station group who makes a constitution station a multicasting receiving station registered as said address receiving station group, A multicasting receiving station which is going to start said radio multicast communication, When it has been recognized that monitor the present multicast session and a receiving station group exists around this multicasting receiving station, Said multicast-transmissions office which transmitted a participation request signal to this receiving station group to said multicast-transmissions office, and received said participation request signal, . Make said multicasting receiving station into a receiving station group's constitution station shown by said participation request signal. Or said multicast-transmissions office which transmitted a receiving station group's group open request signal to said multicast-transmissions office and for which said group open request signal was received when it had not been recognized that a receiving station group exists around said multicasting receiving station, A radio multicasting receiving station group configuration method making said multicasting receiving station into a new receiving station group's constitution station.

[Claim 2]A multicast-transmissions office creates a frame which gave an identifier of an address receiving station group to multiple address data, In order to perform radio multicast communication which transmits multiple address data to a multicasting receiving station once registered as said address receiving station group by frame transmission, In a radio communications system which has a receiving station group who makes a constitution station a multicasting receiving station registered as said address receiving station group, and makes one of the constitution stations of said receiving station group a representative station for the confirmation of receipt of said multiple address data, A multicasting receiving station which is going to start said radio multicast communication, When it has been recognized that monitor the present multicast session and at least one or more receiving station groups exist around this multicasting receiving station, All reply signals to said multicast-transmissions office from a representative station which can be received are memorized with a receiving level of said reply signal, A participation request signal to a receiving station group of a representative station of the highest receiving level in said memorized receiving level is transmitted to said multicast-transmissions office, said multicast-transmissions office which received said participation request signal makes said multicasting receiving station a receiving station group's constitution station shown by said participation request signal, or, When it has not been recognized that a receiving station group exists around said multicasting receiving station, Said multicast-transmissions office which transmitted a receiving station group's group open request signal to said multicast-transmissions office, and received said group open request signal, A radio multicasting receiving station group configuration method making said multicasting receiving station into a new receiving station group's constitution station.

[Claim 3]A multicast-transmissions office creates a frame which gave an identifier of an address receiving station group to multiple address data, In order to perform radio multicast communication which transmits multiple address data to a multicasting receiving station once registered as said address receiving station group by frame transmission, In a radio communications system which has a receiving station group who makes a constitution station a multicasting receiving station registered as said address receiving station group, and makes one of the constitution stations of said receiving station group a representative station for the confirmation of receipt of said multiple address data, A multicasting receiving station which is going to start said radio multicast communication, N (N is natural

number) session monitor of the present multicast session is carried out, When it has been recognized that at least one or more receiving station groups exist around this multicasting receiving station, All reply signals to said multicast-transmissions office from a representative station which can be received are memorized with a receiving level of said reply signal, Said multicast-transmissions office which calculated average value of a receiving level of a reply signal of N session for every representative station, transmitted a participation request signal to a receiving station group of a representative station of the highest receiving level in average value for said every representative station to said multicast-transmissions office, and received said participation request signal, . Make said multicasting receiving station into a receiving station group's constitution station shown by said participation request signal. Or when it has not been recognized that a receiving station group exists around said multicasting receiving station. Said multicast-transmissions office which transmitted a receiving station group's group open request signal to said multicast-transmissions office, and received said group open request signal, A radio multicasting receiving station group configuration method making said multicasting receiving station into a new receiving station group's constitution station.

[Claim 4]A multicast-transmissions office creates a frame which gave an identifier of an address receiving station group to multiple address data, In order to perform radio multicast communication which transmits multiple address data to a multicasting receiving station once registered as said address receiving station group by frame transmission, In a radio communications system which has a receiving station group who makes a constitution station a multicasting receiving station registered as said address receiving station group, and makes one of the constitution stations of said receiving station group a representative station for the confirmation of receipt of said multiple address data, A multicasting receiving station which is going to start said radio multicast communication, N (N is natural number) session monitor of the present multicast session is carried out, When it has been recognized that at least one or more receiving station groups exist around this multicasting receiving station, All reply signals to said multicast-transmissions office from a representative station which can be received are memorized with a transmission source address of this reply signal, Total the number of times which was able to receive a reply signal correctly between N sessions for every representative station, and a participation request signal to a receiving station group of most representative stations of the number of times who was able to receive a reply signal correctly is transmitted to said multicast-transmissions office, . Said multicast-transmissions office which received said participation request signal makes said multicasting receiving station a receiving station group's constitution station shown by said participation request signal. Or when it has not been recognized that a receiving station group exists around said multicasting receiving station. Said multicast-transmissions office which transmitted a receiving station group's group open request signal to said multicast-transmissions office, and received said group open request signal, A radio multicasting receiving station group configuration method making said multicasting receiving station into a new receiving station group's constitution station.

[Claim 5]A multicast-transmissions office creates a frame which gave an identifier of an address receiving station group to multiple address data, In order to perform radio multicast communication which transmits multiple address data to a multicasting receiving station once registered as said address receiving station group by frame transmission, In a radio communications system which has a receiving station group who makes a constitution station a multicasting receiving station registered as said address receiving station group, and makes one of the constitution stations of said receiving station

group a representative station for the confirmation of receipt of said multiple address data, A multicasting receiving station which is going to start said radio multicast communication, N (N is natural number) session monitor of the present multicast session is carried out, When it has been recognized that at least one or more receiving station groups exist around this multicasting receiving station, Memorize all reply signals to said multicast-transmissions office from a representative station which can be received with a receiving level and a transmission source address of said reply signal, and calculate average value of a receiving level of a reply signal of N session for every representative station, and. Total the number of times which was able to receive a reply signal correctly between N sessions for every representative station, and a reply signal in a receiving station group of most representative stations of the number of times who was able to receive correctly, Said multicast-transmissions office which transmitted a participation request signal to a receiving station group of the highest representative station of average value of said receiving level to said multicast-transmissions office, and received said participation request signal, . Make said multicasting receiving station into a receiving station group's constitution station shown by said participation request signal. Or when it has not been recognized that a receiving station group exists around said multicasting receiving station. Said multicast-transmissions office which transmitted a receiving station group's group open request signal to said multicast-transmissions office, and received said group open request signal, A radio multicasting receiving station group configuration method making said multicasting receiving station into a new receiving station group's constitution station.

[Claim 6]A multicast-transmissions office creates a frame which gave an identifier of an address receiving station group to multiple address data, In order to perform radio multicast communication which transmits multiple address data to a multicasting receiving station once registered as said address receiving station group by frame transmission, It is a multicasting receiving station in a radio communications system which has a receiving station group who makes a constitution station a multicasting receiving station registered as said address receiving station group, When it is going to start said radio multicast communication and it has been recognized that monitor the present multicast session and a receiving station group exists around a local station, Since it becomes this receiving station group's constitution station, a participation request signal to this receiving station group is transmitted to said multicast-transmissions office, Or a radio station characterized by transmitting a receiving station group's group open request signal to said multicast-transmissions office since it becomes a new receiving station group's constitution station when it has not been recognized that a receiving station group exists around a local station.

[Claim 7]A multicast-transmissions office creates a frame which gave an identifier of an address receiving station group to multiple address data, In order to perform radio multicast communication which transmits multiple address data to a multicasting receiving station once registered as said address receiving station group by frame transmission, It has a receiving station group who makes a constitution station a multicasting receiving station registered as said address receiving station group, It is a multicasting receiving station in a radio communications system which makes one of the constitution stations of said receiving station group a representative station for the confirmation of receipt of said multiple address data, When it is going to start said radio multicast communication, the present multicast session is monitored, When it has been recognized that at least one or more receiving station groups exist around a local station, All reply signals to said multicast-transmissions office from a

representative station which can be received are memorized with a receiving level of said reply signal, Since it becomes a constitution station of a receiving station group of a representative station of the highest receiving level in said memorized receiving level, Since it becomes a new receiving station group's constitution station when it has not been recognized that transmit a participation request signal to this receiving station group to said multicast-transmissions office, or a receiving station group exists around a local station, A radio station transmitting a receiving station group's group open request signal to said multicast-transmissions office.

[Claim 8]A multicast-transmissions office creates a frame which gave an identifier of an address receiving station group to multiple address data, In order to perform radio multicast communication which transmits multiple address data to a multicasting receiving station once registered as said address receiving station group by frame transmission, It has a receiving station group who makes a constitution station a multicasting receiving station registered as said address receiving station group, It is a multicasting receiving station in a radio communications system which makes one of the constitution stations of said receiving station group a representative station for the confirmation of receipt of said multiple address data, When it is going to start said radio multicast communication, N (N is natural number) session monitor of the present multicast session is carried out, When it has been recognized that at least one or more receiving station groups exist around a local station, All reply signals to said multicast-transmissions office from a representative station which can be received are memorized with a receiving level of said reply signal, it transmitting to said multicast-transmissions office, or a participation request signal to this receiving station group, since average value of a receiving level of a reply signal of N session is calculated for every representative station and it becomes a constitution station of a receiving station group of a representative station of the highest receiving level in average value for said every representative station, A radio station characterized by transmitting a receiving station group's group open request signal to said multicast-transmissions office since it becomes a new receiving station group's constitution station when it has not been recognized that a receiving station group exists around a local station.

[Claim 9]A multicast-transmissions office creates a frame which gave an identifier of an address receiving station group to multiple address data, In order to perform radio multicast communication which transmits multiple address data to a multicasting receiving station once registered as said address receiving station group by frame transmission, It has a receiving station group who makes a constitution station a multicasting receiving station registered as said address receiving station group, It is a multicasting receiving station in a radio communications system which makes one of the constitution stations of said receiving station group a representative station for the confirmation of receipt of said multiple address data, When it is going to start said radio multicast communication, N (N is natural number) session monitor of the present multicast session is carried out, When it has been recognized that at least one or more receiving station groups exist around a local station, All reply signals to said multicast-transmissions office from a representative station which can be received are memorized with a transmission source address of this reply signal, Since it becomes a constitution station of a receiving station group of most representative stations of the number of times who was able to total the number of times which was able to receive a reply signal correctly, and was able to receive a reply signal correctly between N sessions for every representative station, it transmitting to said multicast-transmissions office, or a participation request signal to this receiving station group, A radio station

characterized by transmitting a receiving station group's group open request signal to said multicast-transmissions office since it becomes a new receiving station group's constitution station when it has not been recognized that a receiving station group exists around a local station.

[Claim 10]A multicast-transmissions office creates a frame which gave an identifier of an address receiving station group to multiple address data, In order to perform radio multicast communication which transmits multiple address data to a multicasting receiving station once registered as said address receiving station group by frame transmission, It has a receiving station group who makes a constitution station a multicasting receiving station registered as said address receiving station group, It is a multicasting receiving station in a radio communications system which makes one of the constitution stations of said receiving station group a representative station for the confirmation of receipt of said multiple address data, When it is going to start said radio multicast communication, N (N is natural number) session monitor of the present multicast session is carried out, When it has been recognized that at least one or more receiving station groups exist around a local station, Memorize all reply signals to said multicast-transmissions office from a representative station which can be received with a receiving level and a transmission source address of said reply signal, and calculate average value of a receiving level of a reply signal of N session for every representative station, and. Total the number of times which was able to receive a reply signal correctly between N sessions for every representative station, and a reply signal in a receiving station group of most representative stations of the number of times who was able to receive correctly, Since it becomes a constitution station of a receiving station group of the highest representative station of average value of said receiving level, a participation request signal to this receiving station group is transmitted to said multicast-transmissions office, Or a radio station characterized by transmitting a receiving station group's group open request signal to said multicast-transmissions office since it becomes a new receiving station group's constitution station when it has not been recognized that a receiving station group exists around a local station.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the radio station using the receiving station group configuration method and this method of the multicasting receiving station which exist in [at the time of performing high reliability multi-cast-data delivery in radio] a cell.

[0002]

[Description of the Prior Art]In the conventional multicast communication, best effort type service is assumed to the application which does not need to guarantee reliability, and compensation over mistaken data was not performed. In providing reliable multicasting (high reliability multicasting), What returns an attainment check according [the office which received (1) data from the base station correctly to the transmitted multi cast data] to a positive acknowledge (ACK:Acknowledgment) to a multicast-transmissions office, (2) That to which the office which detected the error at the time of data receiving returns a negative acknowledge (NAK:Negative Acknowledgment) to a multicast-transmissions office, (3) The method of improving the reliability of multi cast data was taken by the retransmitting process as occasion demands using methods, such as what the above (1) and (2) combined.

[0003]. The validity of the representation responding system which decreases the number of responses by carrying out a group division in the multicast communication in the conventional radio environment to the multicasting receiving station which exists in a cell is known. (For example, Inoue, Iizuka,

Takanashi, ****, "examination of high reliability-ized protocol for radio multicast communication", Institute of Electronics, Information and Communication Engineers, and B-5-211, '97 spring synthesis convention, March, 1997). This is enabled to shorten time required for the confirmation of receipt, and efficient multi-cast-data transmission is attained. However, regulation special [except / which is called the offices which can be transmitted and received directly] to mutual as the method of the group division in that case is not carried out.

[0004]

[Problem(s) to be Solved by the Invention](1) - (3) of the above [the former] -- radio multicast communication was performed by the method [like]. Therefore, in high reliability multicast communication, in order to perform an attainment check to each multicasting receiving station, there was a problem that time required for response confirmation increased in proportion to the number of multicasting receiving stations. A throughput falls by this or there was a problem of traffic other than multi cast data being pressed.

[0005]The above-mentioned problem was not shown to the concrete method, although being improved by the grouping of a multicasting receiving station was pointed out.

[0006]The purpose of this invention carries out grouping of the multicasting receiving station, and data transmission times is controlled by performing the confirmation of receipt of data for every group, It is in providing the radio station using the radio multicasting receiving station group configuration method and this method in the radio multicast communication system which is efficient and makes multicast communication of high reliability possible.

[0007]

[Means for Solving the Problem]In order to solve an aforementioned problem, the invention according to claim 1, A multicast-transmissions office creates a frame which gave an identifier of an address receiving station group to multiple address data, In order to perform radio multicast communication which transmits multiple address data to a multicasting receiving station once registered as said address receiving station group by frame transmission, In a radio communications system which has a receiving station group who makes a constitution station a multicasting receiving station registered as said address receiving station group, A multicasting receiving station which is going to start said radio multicast communication, When it has been recognized that monitor the present multicast session and a receiving station group exists around this multicasting receiving station, Said multicast-transmissions office which transmitted a participation request signal to this receiving station group to said multicast-transmissions office, and received said participation request signal, . Make said multicasting receiving station into a receiving station group's constitution station shown by said participation request signal. Or said multicast-transmissions office which transmitted a receiving station group's group open request signal to said multicast-transmissions office and for which said group open request signal was received when it had not been recognized that a receiving station group exists around said multicasting receiving station. It is characterized by making said multicasting receiving station into a new receiving station group's constitution station.

[0008]In the invention according to claim 1, a radio station which it is newly going to receive data delivered by multicasting, (1) When a multicast session performed now is monitored and a receiving station group exists around (2) local stations, Send a participation request to the receiving station group to a multicast-transmissions office, and again, When a receiving station group does not exist on the

outskirts, a multicasting receiving station group's group open request is sent to a multicast-transmissions office, (3) A multicast-transmissions office which received a group participation request or a group open request, A receiving station group's formation is performed by procedure of considering that transmitting origin of a group participation request or a group open request is a receiving station group's constitution station shown by group participation request or a group open request.

[0009]According to this invention, a radio station which is going to receive multi cast data, . [whether after monitoring a multicast session, it participates in the existing receiving station group in a range which can transmit and receive the (a) local station directly, and] (b) Take a procedure of forming a receiving station group oneself when there is no existing group, and it becomes possible to make it recognize that a local station receives multi cast data in a multicast-transmissions office in above any case. Therefore, it is effective in carrying out grouping of the receiving stations which exist in a range which can be mutually transmitted and received inside a cell as a result. A multicast-transmissions office a response to send data by receiving from each group from each multicasting receiving station by that cause, It becomes possible to reduce the number of responses to one multi cast data, and efficient-izing of multi-cast-data transmission and high reliability-ization are attained.

[0010]The invention according to claim 2 creates a frame to which a multicast-transmissions office gave an identifier of an address receiving station group to multiple address data, In order to perform radio multicast communication which transmits multiple address data to a multicasting receiving station once registered as said address receiving station group by frame transmission, In a radio communications system which has a receiving station group who makes a constitution station a multicasting receiving station registered as said address receiving station group, and makes one of the constitution stations of said receiving station group a representative station for the confirmation of receipt of said multiple address data, A multicasting receiving station which is going to start said radio multicast communication, When it has been recognized that monitor the present multicast session and at least one or more receiving station groups exist around this multicasting receiving station, All reply signals to said multicast-transmissions office from a representative station which can be received are memorized with a receiving level of said reply signal, Said multicast-transmissions office which transmitted a participation request signal to a receiving station group of a representative station of the highest receiving level in said memorized receiving level to said multicast-transmissions office, and received said participation request signal, . Make said multicasting receiving station into a receiving station group's constitution station shown by said participation request signal. Or when it has not been recognized that a receiving station group exists around said multicasting receiving station. A receiving station group's group open request signal is transmitted to said multicast-transmissions office, and said multicast-transmissions office which received said group open request signal is characterized by making said multicasting receiving station into a new receiving station group's constitution station.

[0011]A radio communications system in the invention according to claim 2, It comprises a multicasting receiving station which are two or more radio stations which receive multi cast data sent from a multicast-transmissions office which is a radio station which performs data transfer by radio multicasting, and a multicast-transmissions office, There, radio multicast communication using the confirmation of receipt according to a representative station as follows can be performed, for example. Each receiving station group's representative station shall answer an attainment check by polling from a multicast-transmissions office, and, for example a multicast-transmissions office, A multicasting data

frame is once transmitted to two or more multicasting receiving stations by frame transmission, Then, a response to a multicasting data frame is made to return to each group's representative station by polling in a receiving station group, the time of a polled representative station receiving a multicasting data frame correctly -- a positive acknowledge (ACK), when a multicasting data frame is not able to be received correctly, A negative acknowledge (NAK) which requires resending of a frame which failed in reception is returned to a multicast-transmissions office, When it polls to the next receiving station group after fixed time when a multicast-transmissions office receives ACK as a response, and it receives NAK, it is made to resend a multicasting data frame demanded by NAK.

[0012]In such a radio communications system, a radio station which is newly going to start reception of multi cast data, When the present multicast session is monitored, all responses from a representative station which was able to receive are memorized with a receiving level of this response and a response from two or more representative stations is able to be received, it participates in a group of the highest representative station of a receiving level, and, thereby, a receiving station group is constituted. An office which is going to participate in a receiving station group according to the invention according to claim 2 becomes possible [participating in a receiving station group who exists most in the neighborhood], in order that a representative station which returned a response of the maximum receiving level out of a response which a representative station currently monitored returns may carry out group intervention. Therefore, multi-cast-data delivery from a multicast-transmissions office is received, The efficient confirmation of receipt becomes possible at the same time the reliability of a response to multi cast data which can expect to become the same received result (it succeeds/fails at reception of multi cast data) as a representative station of a receiving station group who participated, and a receiving station group's representative station returns increases.

[0013]The invention according to claim 3 creates a frame to which a multicast-transmissions office gave an identifier of an address receiving station group to multiple address data, In order to perform radio multicast communication which transmits multiple address data to a multicasting receiving station once registered as said address receiving station group by frame transmission, In a radio communications system which has a receiving station group who makes a constitution station a multicasting receiving station registered as said address receiving station group, and makes one of the constitution stations of said receiving station group a representative station for the confirmation of receipt of said multiple address data, A multicasting receiving station which is going to start said radio multicast communication, N (N is natural number) session monitor of the present multicast session is carried out, When it has been recognized that at least one or more receiving station groups exist around this multicasting receiving station, All reply signals to said multicast-transmissions office from a representative station which can be received are memorized with a receiving level of said reply signal, Calculate average value of a receiving level of a reply signal of N session for every representative station, and a participation request signal to a receiving station group of a representative station of the highest receiving level in average value for said every representative station is transmitted to said multicast-transmissions office, . Said multicast-transmissions office which received said participation request signal makes said multicasting receiving station a receiving station group's constitution station shown by said participation request signal. Or when it has not been recognized that a receiving station group exists around said multicasting receiving station. A receiving station group's group open request signal is transmitted to said multicast-transmissions office, and said multicast-transmissions office which received said group open request

signal is characterized by making said multicasting receiving station into a new receiving station group's constitution station.

[0014]A radio station which is newly going to receive data delivered by multicasting in the invention according to claim 3, (1) Carry out N session monitor of the present multicast session, (2) When a receiving station group does not exist around a local station, send a receiving station group's group open request to a multicast-transmissions office, When a receiving station group exists around a local station (i.e., when a response from a representative station of a receiving station group who exists around a local station is able to be received), When all responses from a representative station which was able to receive are memorized with a receiving level of this response and a response from two or more representative stations is received, An average of a receiving level of N session is taken for every representative station, and a group participation request to a group of the highest representative station of an average receiving level is sent to a multicast-transmissions office. And a multicast-transmissions office which received (3) group participation request or a group open request considers that transmitting origin of a group participation request or a group open request is a receiving station group's constitution station shown by group participation request or a group open request. A receiving station group's formation is performed by these procedures. According to the invention according to claim 3, a radio station which is newly going to participate in a receiving station group, In order that a representative station to which an average receiving level returned the greatest response out of a response which two or more representative stations return in N times of multicast sessions currently monitored may carry out group intervention, Becoming [to participate in a receiving station group who exists most in the neighborhood] possible, the probability becomes high compared with a method according to claim 2. Therefore, multi-cast-data delivery from a multicast-transmissions office is received, The efficient confirmation of receipt becomes possible at the same time the reliability of a response to multi cast data which becoming the same received result (it succeeds/fails at reception of multi cast data) as a representative station of a receiving station group who participated can expect with high probability, and a receiving station group's representative station returns increases.

[0015]The invention according to claim 4 creates a frame to which a multicast-transmissions office gave an identifier of an address receiving station group to multiple address data, In order to perform radio multicast communication which transmits multiple address data to a multicasting receiving station once registered as said address receiving station group by frame transmission, In a radio communications system which has a receiving station group who makes a constitution station a multicasting receiving station registered as said address receiving station group, and makes one of the constitution stations of said receiving station group a representative station for the confirmation of receipt of said multiple address data, A multicasting receiving station which is going to start said radio multicast communication, N (N is natural number) session monitor of the present multicast session is carried out, When it has been recognized that at least one or more receiving station groups exist around this multicasting receiving station, All reply signals to said multicast-transmissions office from a representative station which can be received are memorized with a transmission source address of this reply signal, Total the number of times which was able to receive a reply signal correctly between N sessions for every representative station, and a participation request signal to a receiving station group of most representative stations of the number of times who was able to receive a reply signal correctly is transmitted to said multicast-transmissions office, . Said multicast-transmissions office which received said participation request

signal makes said multicasting receiving station a receiving station group's constitution station shown by said participation request signal. Or when it has not been recognized that a receiving station group exists around said multicasting receiving station. A receiving station group's group open request signal is transmitted to said multicast-transmissions office, and said multicast-transmissions office which received said group open request signal is characterized by making said multicasting receiving station into a new receiving station group's constitution station.

[0016]A radio station which is newly going to receive data delivered by multicasting in the invention according to claim 4, (1) Carry out N session monitor of the present multicast session, (2) When a receiving station group does not exist around a local station, send a receiving station group's group open request to a multicast-transmissions office, When a receiving station group exists around a local station (i.e., when a response from a representative station of a receiving station group who exists around a local station is able to be received), All responses from a representative station which was able to receive are memorized with an address of transmitting origin of this response, The number of times which was able to receive a response correctly between N sessions for every representative station is totaled, and a group participation request to one arbitrary group out of a receiving station group of most representative stations of the number of times who was able to receive a response correctly is sent to a multicast-transmissions office. And a multicast-transmissions office which received (3) group participation request or a group open request considers that transmitting origin of a group participation request or a group open request is a receiving station group's constitution station shown by group participation request or a group open request. A receiving station group's formation is performed by these procedures.